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SPACE EXPLORATION SYMPOSIUM (A3)
Moon Exploration – Part 1 (2A)

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SCIENTIFIC MOTIVATION AND TECHNOLOGICAL IMPLEMENTATION SCHEMATIC FOR KOREAN LUNAR LANDER

Abstract

The Moon is known as a rich repository not only to retain a record of the early geological evolution of a terrestrial planet including the Earth but also to preserve a unique record of the inner Solar system environment under which life evolved on our planet. Even though more than 100 lunar exploration missions have been attempted so far, most part of the moon still remained undiscovered in terms of various scientific aspects, natural resources utilization possibility and landing sites for habitation feasibility, etc. That's why most of space leading countries including the United States, Russia, China, Japan, and India are still trying to pursue lunar landing or lunar sample return. In 2016, Korea officially inaugurated the 1st phase of a new lunar exploration program focused on the launch of Korean pathfinder lunar orbiter, motivated by the president's directive as well as such worldwide exploration activities. At the same time, Korea has started up the pre-phase A study to make a lunar lander soft-landed on the moon surface in 2020s. In this paper, scientific motivation for Korean lunar lander is derived in order to clarify specific mission objectives and provide the strong scientific definition framework for lander mission feasibility. Referring to the recent work by the International Space Exploration Coordination Group (ISECG) Strategic Knowledge Gap Assessment Team, a set of its scientific definition framework is suggested with a variety of directions to fill the internationally relevant strategic knowledge gaps. In parallel, a series of technological requirements combinations for Korean lunar lander are to be categorized in order to meet scientific motivation. They are also evaluated in terms of feasibility and implementation capability based on nationwide expertise. The requirements call for many technological components which are enumerated to form a set of technology roadmap for lunar lander. A typical architecture of the technology roadmap for Korean lunar lander is well defined and suggested. The scientific motivation and technological implementation schematic with the associated roadmap for Korean robotic lunar lander mission will be utilized to go through the pre-phase A study and to maximize the mutual benefit to both science and exploration objectives. This study will also make contributions not only to properly guide in prioritization of landing mission payloads, but also to inform the definition of objectives for future robotic lunar missions and ground activities by appending previous ISECG's SKG work.